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ABSTRACT

The Satellite Technology Demonstration (STD) is based on the premise that wide-scale distribution of instructional television beamed by a communication satellite is an alternate way of achieving instructional goals. Difficulties encountered are due to the fact that the traditionally stated goals of schools are ambiguous, there is little accountability for internal operations; classrooms have low interdependence; and investment in technology is limited. Any significant use of mediated instruction (30 percent of total instruction) will require role reorganization of the teacher, administrator, and district. Operational changes will be necessary in the certification of mediated instruction and the distribution of financial resources. Technology-advanced instruction can provide a more comprehensive curriculum, high quality courses at reasonable cost, inservice teacher education, and short practical training requiring specific skills. It can also monitor student progress, reduce administrative paperwork, and facilitate communications between schools and state agencies. (NR)

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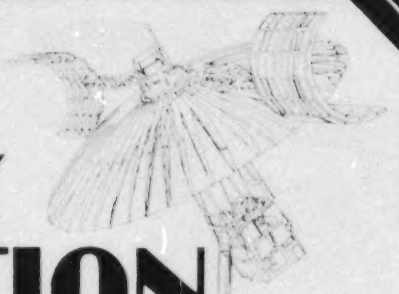
SATELLITE TECHNOLOGY DEMONSTRATION



FEDERATION OF ROCKY MOUNTAIN STATES, INC.

technical report

TR0337

TECHNOLOGICAL INNOVATION AND EDUCATIONAL PRACTICE: A DISCUSSION OF THE FUTURE

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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INTRODUCTION

The purposes of this report are: (1) to describe traditional technological intervention and the application of technology in today's public schools; (2) to discuss the opportunities for, and the constraints to, the application of technology in the schools; and (3) to recommend guidelines for action by future program planners.

The report looks closely at the public school organization -- its perceived mission, goverance, and operational structure -- for this organization contains characteristics that are vital to planning and initiating a project like the Satellite Technology Demonstration (STD). In any large-scale project, it is likely that aggressive leadership will be taken by the technically-skilled person who may not have had the opportunity to keep abreast of either: (1) the applications of technology in the public school; or (2) the extent to which technological procedures influence, and are influenced by, the local and state educational systems.

Further, the report discusses and illustrates for both technical persons and educators a new and intriguing idea: In the context of public school operation, the successful application of technology demands "systems thinking" by the engineer, the school person, and the provider of needed resources.

The report finishes with a brief discussion of suggestions and cautions for future planners. Some of these are an outgrowth of the STD's experience; others are the recommendations of several authors whose recent reports and articles about educational technology contain useful guidance.

PLANNING AND GOAL SETTING

The development of Project goals to guide the operations of the STD's regional staff, state education agency planners, and local clients did not automatically result in complete goal congruency. These four things made it difficult to plan and set Project goals:

1. The schools' traditionally-stated goals are ambiguous.

2. The schools' internal operations are unusually private.

3. The schools' production units (classrooms) have low interdependence.

4. The schools' investments in technology are limited.

We will examine these points, in-depth and in-detail, because they are as vital to planning future satellite projects as they were to implementing this Demonstration.

The schools traditionally have set academic, social service, and maintenance goals. Any reference to research and development among these stated goals is unusual. Thus, the traditional planning processes of the local school and community seldom result in efforts to investigate regional telecommunications capabilities.

Further, state education agencies and local community patrons insist on the development of educational programs designed to meet local needs, as determined through local needs assessments. But traditionally-stated goals -- derived from local needs assessments -- are invariably ambiguous.

Some of the ambiguity is understandable. Human beings change; their views towards the schools change accordingly. The schools must respond to many masters, including: (1) local patrons, who commonly represent a wide range of opinions about the purposes of schooling; (2) supervising state agencies, such as departments of education, health, tax, and revenue, industrial and public safety divisions, and legislative and pressure groups; and (3) quasi-educational and social service agencies, including the Citizen Action Agency, Office of Economic Opportunity, and Migrant Council. Commercial agencies increasingly exert strong influence on the schools.

In the past decade, the Federal Government has significantly altered the schools' operations, if not stated goals, through educational aid to the states and, sometimes, directly to the schools. As a result, the schools may have well-developed goal statements, which have been derived from the appropriate needs assessments, but their operations may produce outcomes that are different from the stated goals.

Goal ambiguity is related to performance invisibility. This means that the public schools' operations are unusually private. Classrooms are, in effect, the production departments of the educational enterprise; in them, teachers teach. Yet, this role

performance is relatively invisible to patrons, fellow staff members, and superiors. Rewards in the teaching profession are, therefore, relatively detached from outsiders' estimates of teacher performance. As long as educational goals and supporting instructional objectives are ambiguous, no clear performance standard can be applied to teaching, and the traditional, uncritical reward system will continue to support goal and performance ambiguity.

Goal and performance ambiguity further are influenced by low interdependence among the schools' production units (classrooms). This has several consequences.

First, it reinforces the popular -- and not altogether spurious -- belief held by professional educators and school patrons: "Academic freedom" depends on individual action. Second, it reinforces the man-to-man style of school staff supervision which Likert (1961) and others have shown to be inimical to organizational effectiveness. Third, in a project like the STD, the organizational interdependency level of the advocate (Project headquarters) is high, while the interdependency level of the client system (local schools) is low. The advocate has simple, rapidly-available output measures to monitor the performance of its product divisions. The client, however, has less clear or nonexistent output measures, as a result of its dissimilar and ambiguous goals.

The lesson, here, is self-evident: To attain reasonable goal congruity, the performance of both the advocate and the client must be similary measurable. But this is not the case.

The client system, more than any other public organization, is vulnerable to control, criticism, and legitimate demands from the surrounding environment. In short, everyone is a stockholder.

Almost any role occupant -- school board member, superintendent, principal, teacher, or staff specialist (even a planning specialist) -- can be criticized, and usually is criticized, by the patrons at large. As a result, the organizational skin becomes extremely sensitive, and program autonomy is reduced sharply. The schools try to prevent criticism by stating goals and outcomes in nonspecific terms. This ambiguity keeps outsiders from measuring progress.

Goal ambiguity, performance invisibility, and low interdependence are not the only

factors that lead to goal incongruity between the technological advocate and the public school client. Future planners should note that the traditional schools' investments in technology (in both processes and products) are extremely low.

In Designing Education for the Future (1968), Heinich, Finn, and Anderson called the schools "cottage industries." They said that public education is the nation's largest single industry (in terms of manpower), but it is a "craft enclave" in a technological society.

The labor intensity of the schools is very high. Yet, the amount spent per worker on the processes and products of technology is extremely low. In 1974, between 79 and 81 percent of a typical, local school system's operational budget was spent on salaries; 4.7 percent was spent on equipment and materials. Further, no state school foundation program (the formula program which allocates state resources to local schools) assists the school in breaking its labor-intensive operation by reallocating a larger share of its resources to equipment. This subject is discussed more fully on page 9.

An outside agency, planning a short-term school intervention program like the STD, will find that its goals, as well as the goals of its client, are quite different. The client's social-organizational environment makes it difficult to match the advocate's goals with the client's purposes. This condition seems to suggest that large-scale, media-based satellite projects would fail. The STD's experience indicates, however, that the Project was able to reach its objectives; that the schools were able to pursue their own objectives and, at the same time, benefit measurably by using the products of the advocate agency.

Most of the schools served by the Project had to respond to local needs assessments or legislative mandates -- both of which advocated the development of career education curriculum and the delivery of career education instruction. But the curriculum in these schools had not been developed at the junior high school level; thus, the career education program developed by the Project was useful not only in furnishing a content structure and instructional template for trial and possible adoption, but also in providing teachers with a representative planning format to develop curriculum down to the elementary school and up to the senior high school.

The STD's experience suggests the following lessons:

1. Don't expect that the goals of the advocate automatically are congruent with the goals of the client.
2. Don't expect that even the most rigorous and painstaking planning will, or should, bring about complete goal congruency.
3. Make certain that the advocate agency supplies the client agency with the means to achieve its traditionally-stated goals.
4. Learn to be completely candid about the differences between 1, 2, and 3.

IMPEDIMENTS TO USING TECHNOLOGY IN EDUCATION

This section of the report tells how the more traditional instructional operations of the schools differ from the requirements of future technology-laden delivery systems. Included are only a few of the educational conditions which are likely to become issues in the future development, delivery, and use of mediated instruction.

The Need to Change Instructional Roles

The wide-scale distribution of instructional television programs differs, in both form and substance, from the use of traditional audio-visual materials. As audio-visual materials were introduced to schools, they were used as teacher "aids." In other words, they were not regarded as self-contained instructional devices: Classroom teachers were needed to complete instructional tasks.

All selection and use of audio-visual aids came under the decision-making and management rights of the teacher. As new instructional developments, such as television and computer-aided instruction, came along, they, too, were used as instructional aids.

The STD's experience with technologically-advanced instruction, however, indicates that mediated instruction can be self-contained. Program planners can assign major instructional tasks to mediated instruction with confidence. Further, grouping films and television programs into large, interconnected packages makes it possible to assign both the major responsibility for instructional implementation and the establishment of basic

instructional format of an entire course to the media. Viewed in these terms, mediated instruction is not an extension of the classroom teacher; it is, instead, an alternate way of achieving instructional goals.

Instructional television, for example, does not help the classroom teacher the way that a chalkboard does. Television is designed to teach objectives set forth by another teacher, the director of television production, as well as the director's staff. Decisions to use mediated instruction, in any form, must be made at the level at which all instructional role assignments are made, not at the level at which they are carried out.

This role concept is no radical departure from tradition. Textbooks are written and distributed by authors and publishers whose functions are performed at locations distant from the schools. They act as distant curriculum developers and teachers.

For years, teachers have felt reasonably comfortable about allowing students direct access to printed forms of instructional media. The difference between a television course and a textbook course is that a classroom teacher may gain entrance into a textbook more easily than into a television. Thus, the teacher can override the textbook's content and presentation at will. But in mediated instruction (via television), the teacher stands aside while television is used as the primary medium of instruction.

For the time in which television is given the primary instructional role, students are assigned to the television teacher. The classroom teacher does not decide whether students will experience the instructional events designed by the television teacher (or producer); that decision is made at the curriculum planning level.

In fact, the classroom teacher may do something else during the instruction. Examples are: person-to-person counseling; group discussions; and evaluations or curriculum planning. These activities do not prevent the classroom teacher from recommending changes in pacing, content, or structure of the television instruction. The teacher, however, must make these changes at the curriculum planning level, not at the implementation level.

The future application of technology to the instructional process centers on:

1. Eliminating the traditional role assignments for classroom teachers; for example, preparing and conveying most of the factual and attitude-influencing content.

2. Expanding the curriculum planning function by agencies outside the school.
3. Developing a more significant role for the classroom teacher in the distinctly human-to-human transactions; for example, student to-teacher and parent-to-teacher counseling sessions.
4. Creating a significantly stronger role for the classroom teacher in curriculum planning and instructional evaluation.

The delivery of an occasional television course to an occasional classroom may not yield the "critical mass" necessary to demand role reorganization. But any significant quantity of mediated instruction (say, 30 percent of the total instruction) will require role reorganization, and this requires planning. Large-scale reorganization, then, has significant implications for the project advocate not only in retraining the client's staff, but also in evaluating and maintaining the client's programs.

Licensing and Sanctioning Practices

The preceding disucssion may suggest that the school, equipped with ample supplies of mediated instruction, could adopt instructional practices that require role reorganization. This is not the case.

The school cannot reassign its staff to different roles, because state certification and accreditation regulations prevent anything more than "token" change. Often, the teacher who uses mediated instruction is certified by the state, but the person -- on film or tape -- who does the teaching is not certified. Is the classroom teacher in charge of the most significant portion of instruction? No, but the certification laws say yes.

The certification laws also say that students must be assigned to a certified teacher. They cannot be assigned to a noncertified proctor, even if the proctor's role is simply to turn on a television monitor and to let the person, on tape, do the teaching. The students are, in effect, assigned to the television teacher. Is this instruction quality teaching? The best! Is this instructional arrangement certifiable? Of course not.

Role reorganization is difficult not only because the state certification laws prevent change, but also because the state accreditation regulations are restrictive. Students,

for example, cannot be given credit for mediated instruction, even though the quality of instruction, as measured by student learning outcomes, is clearly certifiable.

How, then, do we use mediated instruction? The following example suggests an alternative use.

Suppose a high school curriculum planning team decides to use mediated instruction for an in-depth study in literature and humanities. Several scholars are selected to teach the seminar: Norris Houghten, the noted author and critic, who analyzes Ibsen's "The Doll's House"; Clifton Fadiman, who discusses Sinclair Lewis' "Our Town"; John Barnes, who invitingly presents Emily Dickinson's "Magic Prison" in a dramatized dialogue; and Theodore Morrison, who translates and discusses Chaucer's "The Pardoners' Tale." Their lectures are put on film.

The curriculum planning team distributes study materials that route the student from the film discussion, then to selected readings, and finally to discussion groups; all these materials are prepared by the scholars who narrate the films. The films are sent out by either public or commercial television broadcasters, twice each week, at regularly scheduled times. Students, according to their class schedules, have the option to view the materials in their homes, at school, or at any other convenient location. Student progress in the semester's course is monitored by periodic examinations, reports, and papers. The results are examined by the school's curriculum planning and evaluation team. High school and advanced-placement credit is awarded by the local school.

In this example, the broad curriculum strategy is specified by the school; specific instructional content and tactics are determined and implemented by distant scholars; and students undergo instruction outside the regular, "in-school" class schedule. Curriculum offerings are extended without extending the school's scheduled class meetings; top-quality instruction by eminent scholars is provided directly to students without the need for remediating the content through high school English staff; and the costs associated with the live teacher-class contact requirements are reduced substantially.

The new role of the local school personnel is both planning and evaluation. Instructional implementation is assigned to "out-of-school," distant teachers -- Houghten, Fadiman,

and others. Modern educational sanctioning and licensing agencies, influenced by the products and process of technology, now must certify the outcomes of instruction (as measured against quality-seeking criteria) rather than certify the inputs of traditional instruction (the teachers, who are thought to be capable of carrying out instruction).

By extending this example of English instruction to studies in the social and physical sciences, environment and ecology, or law and justice, we find that a critical mass of already-available mediated instruction can be distributed to schools, large and small. This instruction can be used to:

1. Extend the school's curriculum without requiring a corresponding increase in staff.
2. Provide a wide range of logistical options to students who may need to operate on work-study schedules.
3. Furnish the school with the opportunity to shift some of the labor-intensive costs of implementation to planning and evaluation -- role functions which traditionally-certified educators are not prepared to perform.

Financial and Budgetary Practices at the Local Level

We have already seen that in current school budgeting practices about 80 percent of the school's operational budget is spent on salaries; 4.7 percent on equipment and instructional materials. The remaining percentages are spent on fixed charges, debt retirement plans and the like. To illustrate the inflexibility of the school's budget allocating practices, consider an example similar to the one presented above.

Suppose several rural school districts, because of inadequate science teaching facilities and rapid teacher turnover, decide to stabilize and improve their physics teaching capability by cooperatively hiring Harvey White of the University of California, an outstanding teacher and a Nobel Laureat, to teach physics over television. Professor White's salary would be taken from the salary part of the budget. Meanwhile, the districts find out that Harvey White teaches the high school physics course in 162 half-hour films and, after evaluating the series, decide to use the films on television. From the standpoint

of instruction, there is no difference in the two options, since television is used in both cases.

But the purchase of the film course at, say, $20,000 (a cost of one and one-half times a yearly high school teaching salary) would have to come from the smaller part of the budget (4.7 percent). Thus, the districts could not use the mediated instruction, even though this instruction -- with a life expectancy of five years and a yearly implementation cost of $4,000 -- is cheaper than live, teacher-directed instruction.

If mediated instruction consumes a significant portion of the students' instructional day, say, 30 percent, then a system which provides only 4.7 percent of the operational budget is incapable of shifting a labor-intensive expenditure to a capital-intensive expenditure. Program planners should study ways to reduce local budgetary rigidity to allow for a more flexible distribution of funds.

Financial and Budgetary Practices at the State Level

Legislators can visualize a teacher working with students. They also can visualize a librarian, counselor, or any other person rendering an "on-site" instructional service.

The classroom unit, the adopted measure for the distribution of state educational funds, is computed from the traditional experience of educators and lawmakers. A convenient size is 25 students and one teacher. Classroom unit value is the expression used to describe the amount of money, collectable through local and state taxes, which is available to the support of each classroom unit. If, for example, School District X, a poor district, has an equalized valuation per weighted pupil of $2,000, then it has an adjusted classroom unit value of $50,000. Its rich neighbor, District Y, may have a valuation per pupil of $40,000, or a classroom unit value of $1,000,000. Since there are impoverished districts interspersed with wealthy districts in any state, a method of equitable distribution is necessary.

In the past, all states, except Hawaii, have attempted to equalize distribution by developing elaborate school foundation formulas. These formulas vary the way in which pupil population expenditures are calculated by placing state funds where the need to

educate is great.

The methods and formulas of distribution vary, depending on each state's tax assessment practices and on percentages of state and local school funds derived from property taxes, corporation taxes, income taxes, and sales taxes. The total available school dollars raised from state and local taxes is unusually low, because school foundation programs rarely invite a local school district to improve its operation through an incentive system, such as local tax collections. Moreover, some states establish low ceilings on a local district's authority to levy school taxes; this keeps the schools from performing beyond the state's expectations for "quality" education.

The common method for the distribution of state and local resources, then, is based on the traditional and now antiquated structure of a labor-intensive school organization. And the more up-to-date equalization programs are based securely on the "1-to-25" student-teacher classroom arrangement.

Interestingly, when lawmakers implement slight variations in the foundation (equalization) program at the state level, based on a recognition of traditional inputs to the school, they are legislating for Program Planning and Budgeting and Evaluation Systems (PPBES). These budgeting systems measure output, or outcomes.

In the future, state distribution programs must be amended to allow -- indeed, to promote -- the use of different teacher and student groupings and roles. Legislators further must recognize that not all teaching is manufactured, dispensed, and consumed locally, within the traditional, labor-intensive classroom.

THE NEED FOR FUTURE INVESTIGATION

The need for both macro- and micro-economic and operational changes has been mentioned in relation to certifying mediated instruction and distributing financial resources. There also is a need for comparing costs and output quality among various treatment groups at different age-grade-performance levels. This alternative form of instruction further should be varied according to teachers without media, teachers with media, and media

without live instructor supervision.

States (or a cooperative of states with common problems and interests) should look at the economy and cost effectiveness of state school support. Several local school districts, representing a cross-section of available taxable resources, geographic size, pupil populations, and educational needs, should be studied. Specific areas for examination include:

1. The percent of instruction delivered by mediated programming.
2. The methods of staff deployment and cost utility of staff performance in new professional roles.
3. The need for, and cost of, retraining school management and staff.
4. The need for, and costs associated with, supervision and service by the state or intermediate service unit.

THE FUTURE APPLICATION OF TECHNOLOGY

An exhaustive list of the specific uses of technology in education cannot be given in this report. The examples which follow, however, should provide the reader with a sample of discreet uses from which other applications may be made.

Instruction for Students

Since the lag between the recognition of need, invention of program or product to meet the need, and adoption of program or product by the client often is great, one use of mediated instruction would be to furnish students with direct educational experiences, while certified instructional personnel were trained to assume new roles. For example, for at least 15 years, national and state curriculum specialists, along with government and business leaders, have called for improved instruction in economics and personal consumership. While some print and visual instructional materials are available to aid the teacher in this instruction, only slight use of these materials has been made.

Less than four percent of the certified teachers in the nation's elementary and secondary schools have the minimum preparation for certification in economics. Further, the need, as expressed by its thoughtful advocates, is for instruction in personal economics

at any age level below the high school level, in which instructional specialization is common. This need can be filled by:

1. Adapting a personal economics curriculum to the midschool or early senior high school student.
2. Formating the curriculum and instruction for distribution by television and specifying -- clearly and elaborately -- the role functions of the mediated teacher and the classroom teacher (or monitor).
3. Preparing print and other local, teacher-manipulated instructional support materials, including evaluation materials.
4. Arranging for the distribution of programming to a significant number of schools in the nation or region.
5. Distributing the instruction via satellite or through a consortium of public broadcasters, who employ conventional, surface-distribution methods.

This example strongly suggests that both the preparation and the distribution of new instruction, particularly on subjects thought to be of national or regional priority, is especially amenable to mass, economical distribution. Further, when teacher preparation lags behind student need, mediated processes are especially appropriate in providing instruction directly to students.

Another use of mediated instruction would be to furnish students with a more comprehensive curriculum. The curriculums of many small schools are very limited. They usually do not offer accelerated courses for the able student. They seldom provide in-depth coverage of specific topics. Here, then, either year-long or short-unit courses in a variety of subjects could be mediated and, depending on the school's time schedule and instructional costs, could be furnished as an adjunct to, or portion of, an existing course or as a self-contained course transmitted directly to the students.

An example of year-long or short-unit courses might be a series of 16 lessons in advanced concepts in science, taught by a Project Viking scientist, who related basic science concepts and applied engineering techniques to consumer benefit. In this case,

the client group in an individual school probably would be small, as with a science club or a high school physics class. Teacher training in the sciences also might be augmented by the use of mediated instruction.

Still another use of mediated instruction would be to provide students with unique or high-quality courses at reasonable cost. For example, while many high schools have foreign language teachers, only a few schools have native French linguists at their disposal. Characteristically, French is taught in American schools using print-simulus methods rather than using audio-stimulus methods. By augmenting the usual print-simulus approach of the classroom with the audio-stimulus approach of a bilingual French native, conversational French instruction could be generated by one-half dozen native French teachers and could be distributed via satellite relay to a large number of American students.

Instruction for Teachers

Teacher education, particulary in-service education, furnishes many opportunities to use mediated instruction. This is especially true in view of the remoteness of rural school personnel from the colleges and universities where professional courses can be taken. A few specific examples of needed courses are:

1. Using both direct and indirect measures in instructional evaluation.
2. Developing instructional skills in special content areas, such as economics.
3. Managing classroom contingencies.
4. Planning and implementing a local needs assessment.
5. Developing PPBES techniques for school managers.
6. Developing accountability procedures for classroom teachers.
7. Using cueing and fading devices in language arts instruction.
8. Providing reinforcement techniques for teaching the slow learner.
9. Developing techniques for leading discussions.

The use of large-scale delivery systems, such as satellite distribution, would minimize the problem of small audience size and program variety. By using a "university without walls" arrangement, the granting of reciprocal credit could be negotiated among

regional institutions of higher education, thus serving as an incentive for educators to participate in the program.

Instruction for Special Clients

Instruction for special-interest clients is one of the most promising developments for the near future. This instruction would involve the design and delivery of short, practical training programs for groups needing special skills. Examples include:

1. A six-program course, offered twice each week, to real estate firms and brokers on the subject of new federal or state housing regulations.
2. A 10-program course, offered weekly, to emergency medical technicians on recertification requirements.
3. A short course for school food services personnel on topics ranging from personal hygiene to nutrition to commodity storage.
4. A series of programs offered to veterinarians, providing instruction in the recognition, treatment, and reporting of Venezuelan Equine Encephalomelitis or Equine Rhinonumanitis.
5. A series of programs designed for parents of preschool children.
6. A series of technically-sophisticated programs on solar and wind energy for architects and engineers, who are associated with the private and industrial housing industry.
7. A series of courses, offered in a continuing schedule, to law enforcement agency personnel on a variety of topics from investigative procedures to traffic control techniques.

While the above examples normally are not the responsibility of the school, the current focus on adult and career education and the emergence of the community school concept make this instruction relevant to the school planner, who must consider the ground terminal location of a satellite delivery system.

Instruction for Administrators

Much planning needs to be done for developing administrative uses of large-scale

delivery systems. Because the data-transfer capability of satellite delivery systems is well-developed when used in conjunction with state-of-the-art computers, satellite distribution offers enormous potential for accommodating the data and information demands of school districts and state and federal educational agencies.

This report has focused largely on the problems and opportunities of instruction per se. Many people, however, suggest that problems in the management of instruction are greater than in the implementation of instruction. The following examples are only a few of the more global uses of large-scale delivery systems designed for educational administrators.

First, large-scale systems could be used to monitor student progress and to give options for further study. The well-developed programs associated with the Westinghouse Learning Corporation's Project Plan, for example, easily could be distributed via satellite. In this system, students, using mark sense cards, report their daily progress in achieving short-unit objectives; these reports are made each evening before the students leave school. Unit teachers enter the student progress data in a low-cost, desk top computer, which stores the information until it receives a transfer signal from a large, remotely-located computer. This data transaction usually occurs at night, during periods of light data traffic. The central computer analyzes each student's progress and compares the daily progress data with previously-entered personal data, classroom profiles, and past and future course objectives. Still using the light traffic periods, the central computer then scores the daily student reports, makes suggestions to teachers and students about supplementary, alternative or corrective studies or drills, and returns the data to the school's small computer. Early the next morning, the computer provides the school with alternative student prescriptions for the teacher to employ, or not to employ, as determined by the school staff or individual teacher.

Second, large-scale systems could be used to reduce administrative paperwork. School administrators are burdened with reporting information to state and federal agencies on a variety of subjects: student and teacher personal data; attendance data; and financial reports. While a centralized computer storage and retrieval facility normally is available

to state education agencies, the local school administrator still must operate in the paper-pencil-mail delivery mode, often delaying state-level decisions on financial aid to the schools. A satellite distribution system, using simple keyboard data-entering devices with an identifying preamble signal, could reduce some of the local administrator's paperwork and, at the same time, speed up the reporting cycle.

Third, large-scale systems could be used to facilitate communications between state agencies and school personnel. State agency planning and school service personnel need to communicate frequently with many school personnel, counselors, administrators, school boards, citizen accountability committees, and teachers. The video, audio, and data distribution capabilities of satellite systems offer an important communications and service-rendering alternative to present state staff travel to a distant school community in a state motor-pool car -- a trip frequently in excess of 300 miles and seven hours of behind-the-wheel employment. Through a satellite communications system, pending legislation could be transferred in hard-copy form. A resource unit on the subject of a school-community drug and alcohol program could be discussed. A recommendation could be made in answer to a question about a local needs assessment strategy. The available examples are endless.

SUMMARY

No combination of space-borne technical deterrents will prevent the ready adoption of large-scale technology. But the way in which schools traditionally are governed, as well as the way in which the educational profession regards itself, will cause serious problems.

This report has dealt only with a few of the more obvious conditions of local educational agencies which now influence, or will influence, the acceptance and use of mediated instruction, particularly as that instruction involves the use of large-scale delivery of instructional and management services. The report also has described the major conditions which impede the adoption of technology by the schools and, where insight was sufficient, has recommended specific problems to be studied and remedied by state and local agencies prior to full-scale adoption of the processes and products of large-scale distribution

systems.

The report further included a sample of technological applications in education. Future planners are encouraged to develop new uses. The technology is available; some experience now has been gained in developing satellite-based media systems for schools. But much more thorough planning is left for the inventor of future, school-related technology -- the technology of use.

The means are at hand, and the prospects are exciting.

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